IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	Michael R. Krause et al.	Examiner: David E. England
Serial No.:	09/578,019	Group Art Unit: 2143
Filed:	May 24, 2000	Docket No.: 10991834-2
Title:	RELIABLE MULTICAST	

APPEAL BRIEF UNDER 37 C.F.R. §41.37

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed on June 11, 2007, appealing the final rejection of claims 1, 3-30, and 32-53 of the above-identified application as set forth in the Final Office Action mailed May 9, 2007.

The U.S. Patent and Trademark Office is hereby authorized to charge Deposit Account No. 08-2025 in the amount of $500.00 for filing a Brief in Support of an Appeal as set forth under 37 C.F.R. §41.20(b)(2). At any time during the pendency of this application, please charge any required fees or credit any overpayment to Deposit Account No. 08-2025.

Appellant respectfully requests consideration and reversal of the Examiner's rejection of pending claims 1, 3-30, and 32-53.

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REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present Appeal.

STATUS OF CLAIMS

In a Final Office Action mailed March 9, 2007, claims 1, 3-30 and 32-53 were finally rejected. Claims 1, 3-30 and 32-53 are pending in the application, and are the subject of the present Appeal.

STATUS OF AMENDMENTS

No amendments have been entered subsequent to the Final Office Action mailed March 9, 2007. A Response After Final was filed on June 11, 2007, but no amendments to the claims were proposed by Appellants or entered by the Examiner.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The subject matter of the independent claims involved in the Appeal is related to reliable multicasting. The Summary is set forth as exemplary embodiments corresponding to the language of independent claims 1 and 29. Discussions about elements of claims 1 and 29 can be found at least at the cited locations in the specification and drawings.

The present invention, as claimed in independent claim 1, provides a data processing system (500) including the following limitations. A source device (502) participates in a multicast group and includes a first source application instance (AI) (510) producing a first unit of work stream (542), and communication services (CS) (526). Multiple destination devices (504, 506, 508) participate in the multicast group. Each destination device in the

multicast group includes at least one destination AI (512, 514, 516) which consumes units of work, and CS (528, 530, 532). Communication services/fabric (524) provide communication between the source device and the multiple destination devices. Multiple source and destination resources (SDRs) (518a and 518b, 520a and 520b, 522a and 522b). Each SDR implementing an independent reliable transport service between the source device and a corresponding one of the multiple destination devices in the multicast group for delivery of the first unit of work stream at the corresponding one of the multiple destination devices and guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices. Each SDR includes first SDR resources (518a, 520a, 522a) at the source device having at least one queue (240, 242, *see specifically specification at page 18, lines 21-23 and Figure 4*) configured to hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work, and second SDR resources (518b, 520b, 522b) at the corresponding one of the multiple destination devices having state information including an expected next sequence number value (248, *see specifically specification at page 19, lines 7-8 and Figure 4*) indicating an expected defined order corresponding to a next unit of work to be received. The CS in the source device correlates the independent reliable transport services and verifies that a predetermined percentage of destination AIs in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. *See specification, page 30, line 22 through page 41, line 4 and Figures 8-10.*

The present invention, as claimed in independent claim 29, provides a method of processing data comprising producing a first unit of work stream (542) with a first source application instance (AI) (510) at a source device (502) participating in a multicast group; reproducing the first unit of work stream (544, 546, 548); and establishing multiple source and destination resources (SDRs) (518a and 518b, 520a and 520b, 522a and 522b). Each SDR including first SDR resources (518a, 520a, 522a) at the source device having at least one queue (240, 242, *see specifically specification at page 18, lines 21-23 and Figure 4*) for holding transmitted from the source device to a corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work, and second SDR resources (518b, 520b, 522b) at the corresponding one of multiple destination

devices participating in the multicast group having state information including an expected next sequence number value (248, *see specifically specification at page 19, lines 7-8 and Figure 4*) indicating an expected defined order corresponding to a next unit of work to be received. The method comprises implementing corresponding multiple independent reliable transport services with the multiple SDRs. Each independent reliable transport service is implemented between the source device and the corresponding one of multiple destination devices (504, 506, 508), with each destination device having at least one destination AI (512, 514, 516). The method comprises multicasting the reproduced first unit of work stream over a communication services/fabric (524) with the multiple independent reliable transport services; guaranteeing strong ordering of the first unit of work stream received at the corresponding one of multiple destination devices; and correlating the independent reliable transport services including verifying that a predetermined percentage of destination devices in the multicast group reliably has received each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. *See specification, page 30, line 22 through page 41, line 4 and Figures 8-10.*

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. Claims 1, 3, 4, 9-11, 15, 16, 22, 29, 30, 32, 33, 41, 42, and 46 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696 in view of the Nessett et al. U.S. Patent No. 5,968,176 in further view of the Van Loo et al. U.S. Patent No. 6,064,672 in further view of the Ruszczyk U.S. Patent No. 6,205,150.

II. Claims 5-8, 18-20, 34-37, and 44 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Block et al. U.S. Patent No. 6,192,417.

III. Claims 12 and 38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150 in further view of the Hamilton et al. U.S. Patent No. 6,392,993.

IV. Claims 13, 14, 17, 39, 40, and 43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,15, and in further view of the Muller et al. U.S. Patent No. 6,256,740.

V. Claims 21 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

VI. Claims 24, 26, 27, 47, 51, and 52 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No. 6,205,150, and the VanDoren et al. U.S. Patent No. 6,279,084, and in further view of the Hamilton U.S. Patent No. 6,392,993.

VII. Claims 25 and 48-50 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No.

6,205,150, the VanDoren et al. U.S. Patent No. 6,279,084, the Hamilton U.S. Patent No. 6,392,993, and in further view of the Miller U.S. Patent No. 5,553,083.

VIII. Claims 28 and 53 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Mallory U.S. Patent No. 6,335,933.

IX. Claim 45 stands rejected under 35 U.S.C. §103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Block U.S. Patent No. 6,192,417 in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

ARGUMENT

I. The Applicable Law

With regard to a 35 U.S.C. § 103 obviousness rejection: "Patent examiners carry the responsibility of making sure that the standard of patentability enunciated by the Supreme Court and by the Congress is applied in each and every case." M.P.E.P. 2141 (emphasis in the original). The Examiner bears the burden under 35 U.S.C. § 103 in establishing a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

Three criteria must be satisfied to establish a *prima facie* case of obviousness. First, the Examiner must show that some objective teaching in the prior art or some knowledge generally available to one of ordinary skill in the art would teach, suggest, or motivate one to modify a reference or to combine the teachings of multiple references. *In re Fine* at 1074. Second, the prior art can be modified or combined only so long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375, 379 (Fed. Cir. 1986). Third, the reference or combined references must teach or suggest all of the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (C.C.P.A. 1974).

The court in *Fine* stated:

> Obviousness is tested by "what the combined teaching of the references would have suggested to those of ordinary skill in the art." But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination."

> And "teachings of references can be combined *only* if there is some suggestion or incentive to do so."

In re Fine, 5 USPQ2d at 1599 (citations omitted).

There must be some teaching somewhere that provides the suggestion or motivation to combine prior art teachings and applies that combination to solve the same or similar problem that it addresses. *In re Nilssen*, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988); *In re Wood*, 599 F.2d 1032, 1037, 202 USPQ 171, 174 (C.C.P.A. 1979). In particular, "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based upon Appellant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142 (emphasis added).

The test for obviousness under § 103 must take into consideration the invention as a whole; that is, one must consider the particular problem solved by the combination of elements that define the invention. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985). Furthermore, claims must be interpreted in light of the specification, claim language, other claims, and prosecution history. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987), *cert. denied*, 481 U.S. 1052 (1987). At the same time, a prior patent cited as a § 103 reference must be considered in its entirety, "*i.e.* as a *whole*, including portions that lead away from the invention." *Id.* That is, the Examiner must recognize and consider not only the similarities, but also the critical differences between the claimed invention and the prior art as one of the factual inquiries pertinent to any obviousness inquiry under 35 U.S.C. § 103. *In re Bond*, 910 F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990) (emphasis added). Finally, the Examiner must avoid hindsight. *Id.*

With regard for the test for obviousness under § 103, a statement that modifications of the prior art to meet the claimed invention would have been " 'well within the ordinary skill of the art at the time the claimed invention was made' " because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993); M.P.E.P. § 2143.01 (emphasis in the original).

In conclusion, an Appellant is entitled to a patent grant if any one of the elements of a prima facie case of obviousness is not established. The Federal Circuit has endorsed this view in stating: "If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the Appellant is entitled to grant of the patent." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1448 (Fed. Cir. 1992).

A. Rejection of Claims 1, 3, 4, 9-11, 15, 16, 22, 29, 30, 32, 33, 41, 42, and 46 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696 in view of the Nessett et al. U.S. Patent No. 5,968,176 in further view of the Van Loo et al. U.S. Patent No. 6,064,672 in further view of the Ruszczyk U.S. Patent No. 6,205,150.

B. Rejection of Claims 5-8, 18-20, 34-37, and 44 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Block et al. U.S. Patent No. 6,192,417.

C. Rejection of Claims 12 and 38 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150 in further view of the Hamilton et al. U.S. Patent No. 6,392,993.

D. Rejection of Claims 13, 14, 17, 39, 40, and 43 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,15, and in further view of the Muller et al. U.S. Patent No. 6,256,740.

D. Rejection of Claims 21 and 23 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

F. Rejection of Claims 24, 26, 27, 47, 51, and 52 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No. 6,205,150, and the VanDoren et al. U.S. Patent No. 6,279,084, and in further view of the Hamilton U.S. Patent No. 6,392,993.

G. Rejection of Claims 25 and 48-50 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No. 6,205,150, the VanDoren et al. U.S. Patent No. 6,279,084, the Hamilton U.S. Patent No. 6,392,993, and in further view of the Miller U.S. Patent No. 5,553,083.

H. Rejection of Claims 28 and 53 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Mallory U.S. Patent No. 6,335,933.

I. Rejection of Claim 45 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Block U.S. Patent No. 6,192,417 in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

The above rejections A – I are covered together in the following remarks.

Independent claim 1 includes the limitations of the communication services (CS) in the source device correlating the independent reliable transport services and verifying that a predetermined percentage of destination application instances (AIs) in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. Independent claim 29 includes the limitations of correlating the independent reliable transport services including verifying that a predetermined percentage of destination devices in the multicast group reliable has received each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. Independent claims 1 and 29 are not taught or suggested by the cited references alone or in combination.

The Examiner admits that the Miller et al. patent does not teach the following limitations of independent claims 1 and 29: communication services/fabric providing

communication between the source device and the multiple destination devices; guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices; first SDR resources at the source device having at least one queue configured to hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work; and second SDR resources at the corresponding one of the multiple destination devices having state information including an expected next sequence number value indicating an expected defined order corresponding to a next unit of work to be received; and independent reliable transport services.

As admitted by the Examiner, the Miller et al. patent does not teach independent reliable transport services. Therefore, the Miller et al. patent cannot teach correlating independent reliable transport services as recited in independent claims 1 and 29.

As admitted by the Examiner, the Miller et al. patent does not teach guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices. Therefore, the Miller et al. patent cannot teach verifying that a predetermined percentage of destination AIs in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order as recited in independent claims 1 and 29, as these recitations specifically define how the guaranteeing of strong ordering of the first unit of work stream received at the corresponding predetermined percentage of destination AIs in the multicast group is accomplished.

Furthermore, as indicated in the Examiner Interview Summary filed with the Amendment/Reply filed on June 9, 2006, and as further indicated in the Examiner Summary provided by Examiner England on May 15, 2006, in the telephonic Examiner Interview of May 8, 2006, Examiner England agreed that the Miller et al. patent teaches a threshold of number of allowed drop frames not a percentage of destination application instances that receive every unit in the first unit of work stream in the expected defined order as recited in the previous independent claims 1 and 29. The same reasoning for this distinction applies with the currently clarified language of independent claims 1 and 29, specifically that **the Miller et al. patent teaches a threshold of a number of allowed drop frames not a percentage of destination application instances that receive each unit of work or a**

cumulative set of units of work in the first unit of work stream in the expected defined order to achieve guaranteed strong ordering of the first unit of work stream received at the corresponding predetermined percentage of destination AIs in the multicast group as recited in Independent claims 1 and 29. Thus, Appellant respectfully submits that the statement made in the Examiner Interview Summary provided by Examiner England on May 15, 2006 and in the telephone Examiner Interview of May 8, 2006 related to that independent claims 1 and 29 overcome the rejections based on the currently cited references including the Miller et al. patent still apply.

Nevertheless, in the Final Office Action mailed May 9, 2007, the Examiner cites the Miller et al. patent at column 2, lines 52-56, which states "[a]fter the server has sent the entire amount of data (e.g., the entire file) over the link to the clients, the server performs a second round of transmissions in which it only resends the particular packets indicated by the clients as requiring retransmission." This section of the Miller et al. patent describes employing multiple rounds of transmission, and this teaches away from guaranteed strong ordering and more specifically teaches away from verifying that a predetermined percentage of destination AIs in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order as recited in independent claims 1 and 29. Thus, independent claims 1 and 29 are believed to be allowable. Appellant respectfully submits the additional following remarks to further support allowability of independent claims 1 and 29.

The Examiner cites the Van Loo et al. patent for teaching guaranteed strong ordering. The Miller et al. patent, however, teaches away from employing guaranteed strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices as recited in independent claims 1 and 29. First, at column 4, line 66-column 5, line 8, the Miller et al. patent specifically states,

> If, after the entire file has been transmitted over the link 24, the negative acknowledgments indicate that certain frames need to be retransmitted over the link 24 (step 12), only those certain frames are retransmitted (step 14). As those certain frames are being retransmitted over the link 24, frame negative acknowledgments from one or more of the recipients 22 are received via the link 24 (step 14.) This process is then repeated as many times as necessary until no more frames need to be retransmitted.

Thus, a defined order provided by guaranteed strong ordering would not work with this scheme disclosed in the Miller et al. patent where the negative acknowledgments indicate that certain frames need to be retransmitted and only those certain frames are retransmitted.

Secondly, the Miller et al. patent, at column 11, line 39-column 12, line 4, further teaches away from guaranteeing strong ordering of the first unit of work stream received at the corresponding one of multiple destination devices. This section of the Miller et al. patent teaches that a group threshold parameter may be set by the user as the limit, expressed in percent of drop frames, by a particular client that is allowed for continuing participation in the multicast group. Such a threshold cannot be used with a guaranteed strong ordering of the first unit of work stream received at the corresponding one of multiple destination devices as recited in independent claims 1 and 29.

Furthermore, the Van Loo et al. patent teaches away from using strong ordering in a data processing system, such as, claimed in independent claim 1 or in a method of processing data, such as claimed in independent claim 29.

The Van Loo et al. patent discloses a reliable transport scheme in ringlet networks that employs strong sequential ordering (SSO). To achieve the SSO, the Van Loo et al. system employs certain characteristic features of ringlet networks. In particular, SSO is achieved by a source device in the ringlet indicating a sequence number in each transmitted packet, and the destination devices participating in the SSO scheme keeping track of the sequence numbers in the received packets such that an out-of-sequence packet is identifiable. If an error is identified, all packets received subsequently to the last good packet must be re-transmitted to the destination devices in the ringlet. Appellant respectfully points out relevant language in the Van Loo et al. patent beginning at col. 12, line 6, "Fundamental to the proposal is the assumption that *local ringlet transmission is unidirectional and bypasses no nodes*. . . .[a ringlet employing an optional short cut routing feature] would not support SSO ordering."

Although the Van Loo et al. patent discloses the use of SSO for reliable transport, this reference teaches away from multiple SDRs, each SDR implementing an independent reliable transport service between the source device and a corresponding one of the multiple destination devices in the multicast group, as recited in independent claims 1 and 29. By

contrast, the Van Loo et al. patent teaches essentially a singular transport service such that, as stated beginning at col. 13, line 64, "Once [an error] is detected at the producer node, the SSO state values maintained for this producerId at every node in the ringlet are in question. Each ringlet node's SSO state information for this producerID must be reset, without any change in either the SSO programming space for this producerId or for any other producer node."

The Examiner cites the Ruszczyk patent to teach the limitations of independent claims 1 and 29 of first SDR resources at the source device having at least one queue for holding transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work. Appellant, however, respectfully submits that these limitations are not taught or suggested by the Ruszczyk patent. Instead, the Ruszczyk patent teaches, beginning at column 4, line 47, and illustrated in Figure 2, that a first network device determines a scheduling priority for data packets in a first queue. The first network device inserts higher priority data packets into a second queue. The first network device inserts lower priority data packets into a third queue. The first network device schedules higher priority data packets in the second queue where data packets are transmitted as higher priority data packets. The first network device schedules lower priority data packets in the third queue with transmission deadlines where lower priority data packets are executed after higher priority data packets. The first network device promotes a lower priority data packet in the third queue to the second queue when a transmission deadline for the lower priority packet has expired. Thus, these first, second, and third queues disclosed in the Ruszczyk patent hold not yet transmitted units of work, but do not hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work. Thus, the Ruszczyk patent does not teach or suggest first SDR resources at the source device having at least one queue for holding transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work as recited in independent claims 1 and 29.

In view of the above, the Miller et al. patent, the Nessett et a. patent, the Van Loo et al. patent, and the Ruszczyk patent do not teach or suggest alone or in combination all of the limitations of independent claim 1 or all of the limitations of independent claim 29.

In addition, dependent claims 3-28 are allowable as depending from an allowable base claim (claim 1) and are allowable on further independent grounds in view of the novel and non-obvious features and combinations set for therein. Dependent claims 30 and 32-53 are allowable as depending from an allowable base claim (claim 29) and are allowable on further independent grounds in view of the novel and non-obvious features and combinations set forth therein.

Therefore, Appellants respectfully submit that the above A – I rejections under 35 U.S.C. § 103 must be withdrawn, and respectfully request the Examiner be reversed and claims 1, 3-30, and 32-53 be allowed.

CONCLUSION

For the above reasons, Appellants respectfully submit that the cited references do not nor render obvious claims of the pending Application. The pending claims distinguish over the cited references, and therefore, Appellants respectfully submit that the rejections must be withdrawn, and respectfully request the Examiner be reversed and claims 1, 3-30, and 32-53 be allowed.

Any inquiry regarding this Response should be directed to either Patrick G. Billig at Telephone No. (612) 573-2003, Facsimile No. (612) 573-2005 Kevin Hart at Telephone No. (970) 898-7057, Facsimile No. (970) 898-7247. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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Dated: August 13, 2007
PPK:cmj:dmw

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CLAIMS APPENDIX

1. (Previously Presented) A data processing system comprising:

a source device participating in a multicast group and including:

a first source application instance (AI) producing a first unit of work stream; and

communication services (CS);

multiple destination devices participating in the multicast group, each destination device in the multicast group including:

at least one destination AI which consumes units of work; and

CS;

communication services/fabric providing communication between the source device and the multiple destination devices;

multiple source and destination resources (SDRs), each SDR implementing an independent reliable transport service between the source device and a corresponding one of the multiple destination devices in the multicast group for delivery of the first unit of work stream at the corresponding one of the multiple destination devices and guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices, wherein each SDR includes:

first SDR resources at the source device having at least one queue configured to hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work; and

second SDR resources at the corresponding one of the multiple destination devices having state information including an expected next sequence number value indicating an expected defined order corresponding to a next unit of work to be received; and

wherein the CS in the source device correlates the independent reliable transport services and verifies that a predetermined percentage of destination AIs in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order.

2. (Cancelled)

3. (Previously Presented) The data processing system of claim 1 wherein the predetermined percentage is 100% of the destination AIs.

4. (Previously Presented) The data processing system of claim 1 wherein the predetermined percentage is less than 100% of the destination AIs.

5. (Previously Presented) The data processing system of claim 1 wherein the CS in the source device includes:

an acknowledgement counter which counts acknowledgements received from the corresponding destination devices in the multicast group indicating that the corresponding destination device has received a unit of work or a cumulative set of units of work in the first unit of work stream.

6. (Previously Presented) The data processing system of claim 5 wherein the CS in the source device generates a completion event when the acknowledgement counter indicates that the predetermined percentage of destination AIs in the multicast group have acknowledged the unit of work or a cumulative set of units of work has been received.

7. (Previously Presnted) The data processing system of claim 1 wherein the CS in the source device includes:

a bit-mask array which assigns a unique bit for each destination AI in the multicast group and clears each bit as a corresponding acknowledgment is received from the corresponding destination device in the multicast group indicating that the corresponding destination device has received a unit of work or the cumulative set of units of work in the first unit of work stream.

8. (Previously Presented) The data processing system of claim 7 wherein the CS in the source device generates a completion event when the bit-mask array has the predetermined percentage of bits cleared in the bit-mask array indicating that the predetermined percentage

of destination AIs in the multicast group have acknowledged the unit of work or the cumulative set of units of work has been received.

9. (Original) The data processing system of claim 1 wherein the CS in the source device replicates the first unit of work stream for transmission to the destination AIs in the multicast group.

10. (Original) The data processing system of claim 1 wherein the communication services/fabric includes at least one replicater component for replicating the first unit of work stream for transmission to the destination AIs in the multicast group.

11. (Original) The data processing system of claim 1 wherein the data processing system further comprises:

at least one middleware AI.

12. (Original) The data processing system of claim 11 wherein the CS in the source device includes a timing window and if the timing window expires without necessary conditions for a completion event occurring, then the middleware AI or CS tracks and resolves missing acknowledgments.

13. (Original) The data processing system of claim 11 wherein a given AI joins the multicast group by performing a multicast join operation, and the middleware AI or CS determines whether the given AI can join the multicast group, validates access rights, and informs the devices participating in the multicast group of changes in the group.

14. (Original) The data processing system of claim 11 wherein a given AI leaves the multicast group by performing a multicast leave operation, and the middleware AI or CS informs the devices participating in the multicast group to remove the given AI from the destination list, to complete all in-flight units of work as though the given AI were still present, and to not target the given AI for units of work not yet launched.

15. (Original) The data processing system of claim 11 wherein an AI, middleware AI, or CS performs a get attribute operation to query current attributes of the multicast group.

16. (Original) The data processing system of claim 11 wherein an AI, middleware AI, or CS performs a set attribute operation to set multicast group attributes.

17. (Original) The data processing system of claim 11 wherein middleware AI performs a remove member operation to remove a given AI from the multicast group without involving the given AI.

18. (Original) The data processing system of claim 1 wherein an agreed to multicast address is employed to address AIs in the multicast group.

19. (Original) The data processing system of claim 18 wherein the CS in each device participating in the multicast group interprets the agreed to multicast address and responds to the agreed to multicast address to perform a reliable multicast operation on behalf of the corresponding destination AI.

20. (Original) The data processing system of claim 1 wherein the data processing system performs a reliable multicast operation having substantially the same semantic behavior relative to a given AI as an unreliable multicast operation.

21. (Original) The data processing system of claim 1 wherein the multiple SDRs are grouped into multiple SDR groups, wherein each of the multiple SDR groups includes at least one SDR and is assigned a unique priority level for effecting throughput and response time of units of work transmitted by the at least one SDR.

22. (Original) The data processing system of claim 1 wherein the source device also functions as a destination device and at least one of the destination devices also functions as a source device.

23. (Original) The data processing system of claim 1 wherein each SDR includes:

source SDR resources, at the source device, transmitting the first unit of work stream in a serial unit of work stream having units of work in a defined order over the communication services/fabric; and

destination SDR resources, at the corresponding destination device, receiving the serial unit of work stream, and demultiplexing the serial unit of work stream into units of work provided to the corresponding at least one destination AI.

24. (Original) The data processing system of claim 23 wherein the destination SDR resources provide a negative acknowledgement (NAK) for a unit of work received ahead of its defined order.

25. (Original) The data processing system of claim 23 wherein the destination SDR resources drop a unit of work received ahead of its defined order.

26. (Original) The data processing system of claim 23 wherein the destination SDR resources provide a positive acknowledgement (ACK) for each unit of work which is successfully received and processed by the destination SDR resources.

27. (Original) The data processing system of claim 23 wherein the destination SDR resources provide a cumulative positive acknowledgement (ACK) for a set of units of work that indicate that all units of work in the set of units of work up to and including a current unit of work have been successfully received and processed by the destination SDR resources.

28. (Original) The data processing system of claim 18 wherein the destination SDR resources drop a unit of work in response to an indication that the unit of work is a duplicate unit of work.

29. (Previously Presented) A method of processing data comprising:

producing a first unit of work stream with a first source application instance (AI) at a source device participating in a multicast group;

reproducing the first unit of work stream;

establishing multiple source and destination resources (SDRs), each SDR including:

first SDR resources at the source device having at least one queue for holding transmitted from the source device to a corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work; and

second SDR resources at the corresponding one of multiple destination devices participating in the multicast group having state information including an expected next sequence number value indicating an expected defined order corresponding to a next unit of work to be received;

implementing corresponding multiple independent reliable transport services with the multiple SDRs, each independent reliable transport service being implemented between the source device and the corresponding one of multiple destination devices, each destination device having at least one destination AI;

multicasting the reproduced first unit of work stream over a communication services/fabric with the multiple independent reliable transport services;

guaranteeing strong ordering of the first unit of work stream received at the corresponding one of multiple destination devices; and

correlating the independent reliable transport services including verifying that a predetermined percentage of destination devices in the multicast group reliably has received each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order.

30. (Original) The method of claim 29 further comprising the step of:

consuming the first unit of work stream with the at least one destination AI at each of the multiple destination devices participating in the multicast group.

31. (Cancelled)

32. (Previously Presented) The method of claim 29 wherein the predetermined percentage is 100% of the destination devices.

33. (Previously Presented) The method of claim 29 wherein the predetermined percentage is less than 100% of the destination devices.

34. (Previously Presented) The method of claim 29 further comprising the steps of:

providing acknowledgments from the corresponding destination devices in the multicast group indicating that the corresponding destination device has received a unit of work or a cumulative set of units of work in the first unit of work stream; and

counting acknowledgements received at the source device.

35. (Previously Presented) The method of claim 34 further comprising the step of:

generating a completion event when the acknowledgement counter indicates that the predetermined percentage of destination devices in the multicast group have acknowledged the unit of work or the cumulative set of units of work has been received.

36. (Previously Presented) The method of claim 29 further comprising the steps of:

assigning a unique bit for each destination device in the multicast group in a bit-mask array; and

clearing each bit as a corresponding acknowledgment is received from the corresponding destination device in the multicast group indicating that the corresponding destination device has received a unit of work or a cumulative set of units of work in the first unit of work stream.

37. (Previously Presented) The method of claim 36 further comprising the step of:

generating a completion event when the bit-mask array has the predetermined percentage of bits cleared in the bit-mask array indicating that the predetermined percentage of destination AIs in the multicast group have acknowledged the unit of work or the cumulative set of units of work has been received.

38. (Original) The method of claim 29 further comprising the step of:

maintaining a timing window; and

if the timing window expires without necessary conditions for a completion event occurring, tracking and resolving missing acknowledgments.

39. (Original) The method of claim 29 further comprising the steps of:

performing a multicast join operation to join a given AI into the multicast group including the steps of:

determining whether the given AI can join the multicast group;

validating access rights; and

informing the devices participating in the multicast group of changes in the group.

40. (Original) The method of claim 29 further comprising the steps of:

performing a multicast leave operation to permit a given AI to leave the multicast group including informing the devices participating in the multicast group to remove the given AI from the destination list, to complete all in-flight units of work as though the given AI were still present, and to not target the given AI for units of work not yet launched.

41. (Original) The method of claim 29 further comprising the step of:

performing a get attribute operation to query current attributes of the multicast group.

42. (Original) The method of claim 29 further comprising the step of:

performing a set attribute operation to set multicast group attributes.

43. (Original) The method of claim 29 further comprising the step of:

performing a remove member operation to remove a given AI from the multicast group without involving the given AI.

44. (Original) The method of claim 29 further comprising the step of:

addressing AIs in the multicast group with an agreed to multicast address.

45. (Original) The method of claim 29 further comprising the steps of:

grouping the multiple reliable transport services into multiple reliable transport service groups, wherein each of the multiple reliable transport service groups includes at least one reliable transport service; and

assigning a unique priority level to each reliable transport service group for effecting throughput and response time of units of work transmitted by the at least one reliable transport service.

46. (Original) The method of claim 29 wherein the source device also functions as a destination device and at least one of the destination devices also functions as a source device.

47. (Original) The method of claim 29 further comprising the step of:

providing a negative acknowledgement (NAK) for a unit of work received at a corresponding destination device ahead of a defined order assigned to the unit of work.

48. (Original) The method of claim 29 further comprising the step of:

dropping a unit of work received at a corresponding destination device ahead of a defined order assigned to the unit of work.

49. (Original) The method of claim 29 further comprising the step of:

temporarily storing a unit of work received at a corresponding destination device ahead of a defined order assigned to the unit of work.

50. (Original) The method of claim 49 further comprising the step of:

performing a resynchronization operation to recover a missing intermediate unit of work.

51. (Original) The method of claim 29 further comprising the step of:

providing a positive acknowledgement (ACK) for each unit of work which is successfully received and processed at a corresponding destination device.

52. (Original) The method of claim 29 further comprising the step of:

providing a cumulative positive acknowledgement (ACK) for a set of units of work that indicate that all units of work in the set of units of work up to and including a current unit of work have been successfully received and processed at a corresponding destination device.

53. (Original) The method of claim 29 further comprising the steps of:

indicating that the unit of work is a duplicate unit of work based on the unit of work being received at a corresponding destination device behind a defined order assigned to the unit of work; and

dropping the unit of work in response to the indication that the unit of work is a duplicate unit of work.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.